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TWO NEW SUBSPECIES OF *EUPHYDRYAS CHALCEDONA*

FROM THE MOJAVE DESERT OF SOUTHERN CALIFORNIA

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Euphydryas chalcedona Doubleday (Nymphalidae) reaches its greatest diversity of geographic variation in the southern California region. This checkerspot ranges from the coast through the lower mountain slopes into the mountain ranges of the eastern deserts. In these desert ranges, isolated populations have diverged considerably in phenotype in all stages of the life cycle, and have been studied by lepidopterists since Hovanitz' excellent work in the 1940's and 1950's. The imminent publication of a book (Emmel and Emmel, 1973) on the butterflies of southern California requires the description of two widely recognized but unnamed subspecies endemic to certain of the mountain ranges of the eastern and western Mojave Desert.

***Euphydryas chalcedona kingstonensis*, new subspecies** (Figure 1, a and b)

Diagnosis: This is a *small* subspecies with *tannish brown* ground color. The forewings above are usually well marked with black scaling, contrasting sharply with the light tan apical spots. The females are less marked with black on the inner half of the forewings. The hindwings above are light tan in ground color, largely overlaid with rich fulvous brown in the medial portions and black along the proximal anal margin. A double line of black outlines the submarginal row of light tan spots. Ventrally, the forewings of both sexes are quite similar. A double row of creamy arrowhead-shaped spots (five in each row), separated by black scaling, occurs from the apex to the midpoint of the outer forewing edge. Some light tan

to creamy scaling extends along the leading forewing edge to the medially-placed, black-outlined rectangular spot of slightly darker fulvous at the distal end of the cell. More proximally, there is a second black-outlined rectangular spot of slightly darker fulvous within the cell. The remainder of the forewing is concolorous dull tannish brown, with only a touch of faint black scaling at several points along the trailing edge of the forewing on some specimens. The undersurface of the hindwing in both sexes is strongly whitish cream in overall aspect, with a submarginal row of large, rounded arrowhead-shaped cream spots (edged in black and proximally shaded with a greater amount of black), a medial row of large polygonal cream spots edged with black, and four or more irregularly-shaped cream spots (edged with black) close to the body. The dull tannish brown of the forewings is found around these proximal hindwing spots, the marginal edge of the wing, and as patches on tannish-cream spots lying between the outer and medial rows of large black-outlined cream spots previously mentioned.

The subspecies is named for the type locality, the Kingston Range of the eastern Mojave Desert (Section 3, Township 19 North, Range 10 East). For many years, collectors have taken these brown *Euphydryas* in the Providence Mountains and have often referred to them as *Euphydryas chalcedona hermosa* Wright (1905) for the want of a better name. However, *E. c. hermosa* is a distinctly rich deep *orangish* subspecies, whereas *E. c. kingstonensis* Emmel & Emmel is dull tannish brown. Furthermore, *kingstonensis* tends to be more heavily marked with black scaling on the upperside. The range of *E. c. hermosa* is centered in the lower mountains of Arizona; additional populations are known from northwestern New Mexico, and southern Utah. There are long series of that subspecies in the collection of the Los Angeles County Museum of Natural History from Oak Creek Canyon and Rainbow Trail, Coconino County, Arizona; Paradise, Arizona; Peppersauce Canyon, Santa Catalina Mts., Arizona; Roosevelt Dam, Gila County, Arizona; Chiricahua Mts., Cochise County, Arizona; Fort Wingate, New Mexico; Stockton and Eureka, Utah.

The foodplant of *Euphydryas chalcedona kingstonensis* is the bush penstemon, *Penstemon antirrhinoides* Benth. ssp. *microphyllum* (Gray) Keck (Scrophulariaceae).

HOLOTYPE Male: Radius of forewing, 19.5 mm; CALIFORNIA, San Bernardino County, rocky canyon 3/4 air mile SE of Horse Thief Springs, 4400-4800', Kingston Range. [Lo-

cality No.] #134b. Larva collected March 29, 1969. Emerged: IV-14-1969 (John F. Emmel & Oakley Shields).

ALLOTYPE Female: Radius of forewing, 23.0 mm; same locality data and collectors as holotype. Larva collected March 29, 1969. Emerged: IV-17-1969.

PARATYPES: 24 specimens as follows: same data as holotype, ex larvae, with emergence dates from IV-13 to IV-20, 1969: 11 males, 13 females.

The holotype and allotype will be deposited in the collection of the Los Angeles County Museum of Natural History. Paratypes will be placed in the collections of the following institutions: Los Angeles County Museum of Natural History, Allyn Museum of Entomology, United States National Museum, and the Lepidoptera Research Foundation.

In addition to the type material, we have examined several hundred specimens of wild-caught and reared adults from Bonanza King Mine Canyon and other localities in the Providence Mountains, and from the Granite Mountains north of Amboy, San Bernardino County. Adults of these populations are slightly less heavily marked with black dorsally, but are assignable to the name *kingstonensis*.

***Euphydryas chalcedona corralensis*, new subspecies**

(Figure 1, c and d)

Diagnosis: This is a generally small subspecies with a ground color of *dull orangish red*, even coral red on fresh individuals. The forewings above have yellowish cream spots extending from the basal to submarginal areas, in four wavy vertical rows (less well defined proximally). The two distal, submarginal rows of yellowish cream spots are well outlined with black scaling, more extensive in the female and extending to the proximal (basal) yellowish cream spots in that sex. The hindwings above are almost uniformly dull orangish red in about half the adults, the remainder having several partial to occasionally nearly complete submarginal and basal rows of cream colored spots extending forward from the rear margin. The posterior basal portion of the hindwing is washed with black scaling. Ventrally, the wings of both sexes are similar in general aspect and have the same dull coral ground color. A double row of yellowish cream apical spots (four to five), separated by black scaling, occurs from the apex to almost the

midpoint of the outer forewing edge. Several separate light yellowish cream median spots occur below the inner spot row. The usual two black-outlined spots in and at the end of the forewing cell are weakly present and irregular in outline; the inner portions of these spots are coral. The undersurface of the hindwing presents a strikingly uniform alternation of two rows (marginal and medial) of coral spots, starting at the margin, and two rows of large yellowish cream spots (submarginal and submedial), with a mixture of coral and yellowish cream spots of irregular shape in the basal portion.

The subspecies is named for the type locality, Rock Corral at the south end of Johnson Valley at the base of the foothills (locally known as the Bighorn Mountains) of the northeastern end of the San Bernardino Mountains, in the southwestern Mojave Desert (Section 27, Township 3 North, Range 4 East). Collectors who have taken this reddish checkerspot here in past years have often referred to it erroneously as *Euphydryas chalcedona quino* Behr (1863), a quite different butterfly named from the western Colorado Desert in San Diego County. A full discussion of the taxonomic confusion surrounding the latter insect is given elsewhere (Emmel & Emmel, 1973).

The foodplant of *Euphydryas chalcedona corralensis* Emmel & Emmel is *Penstemon antirrhinoides* ssp. *microphyllum*.

HOLOTYPE Male: Radius of forewing, 21.0 mm.; CALIFORNIA, San Bernardino County, Rock Corral, III-22-1965, leg. T. C. Emmel & J. F. Emmel.

ALLOTYPE Female: Radius of forewing, 24.0 mm.; same locality as holotype, with data label as "Rock Corral, S. Bernardino C., 10 Mar. 1936, female Coll. by [Bred] C. M. Dammers" (brackets ours).

PARATYPES: 65 specimens as follows: same data as holotype, 5 males; same data as allotype except collected as larvae (no date given) and emergence dates as follows for 26 males (5 March to 14 April 1936) and 32 females (15 March to 20 April 1936); Rattlesnake Canyon, 1 male, 24 March 1935, and 1 female, 29 March 1935, C. M. Dammers [San Bernardino County, seven miles to the west of Rock Corral].

The holotype and allotype will be deposited in the collection of the Los Angeles County Museum of Natural History. Paratypes will be placed in the collections of the following institutions: Los Angeles County Museum of Natural History, Allyn Museum of Entomology, United States National Museum and the Lepidoptera Research Foundation.



Fig. 1.—Two new subspecies of *Euphydryas chalcedona* from the Mojave Desert: *E. chalcedona kingstonensis* Emmel & Emmel (upper left, holotype male; upper right, allotype female) from the Kingston Range, and *E. chalcedona corralensis* Emmel & Emmel (lower left, holotype male; lower right, allotype female) from Rock Corral.

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LITERATURE CITED

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